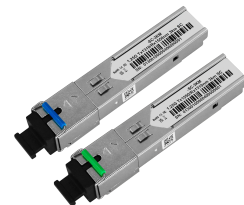
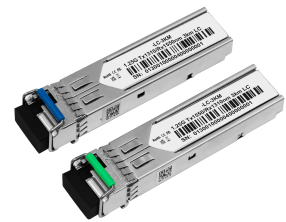


---

## **SFP Single Mode Fiber BIDI Transceiver 1310nm 1250Mbps 3KM**

### **ProductFeatures**

- Uncooled Laser Diode with MQW Structure
- InGaAs PIN-TIA Photodiode Receiver
- 9/125μm SMF
- BIDI Single Mode Transceiver SFP Footprint
- LC Or SC Optical Interface Are Optional
- Compliant With SFP MSA and SFF-8472
- Digital Diagnostic Monitoring Interface
- Single +3.3V Power Supply
- CML Differential Inputs and Outputs
- LVTTTL Signal Detection Output
- Compliant With ITU-TG.957
- Compliant With RoHS and LeadFree
- Metal Enclosure for Lower EMI
- Operating Case Temperature:
  - Standard: 0 to +70°C
  - Extend: -20 to +85°C
  - Industrial: -40 to +85°C



# Product Datasheet

## Product Applications

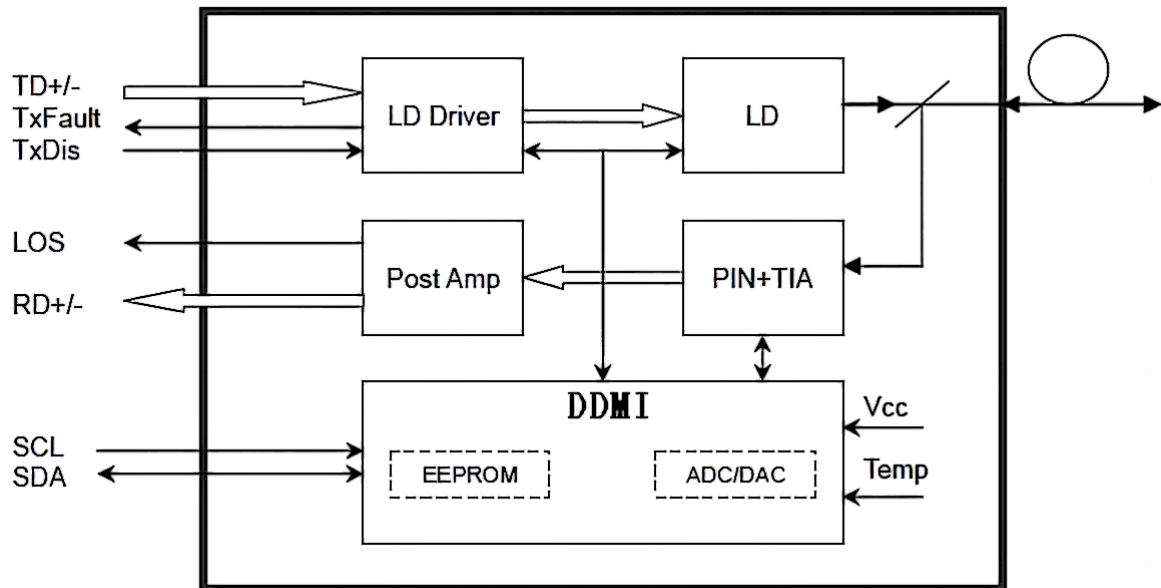
- ✦ Fast Ethernet
- ✦ ATM/SONET/SDH
- ✦ Switch/Router
- ✦ Other Optical Transmission Systems

## General Description

The SFP transceivers are high performance, cost effective modules supporting data-rate of 1250Mbps on 9/125μm SMF

The transceiver consists of three sections: a laser transmitter, a PIN photo diode integrated with a trans-impedance preamplifier (TIA) and DDM control unit. All modules satisfy class II laser safety requirements.

The transceivers are compliant with the Small Form-Factor Pluggable (SFP) Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA.



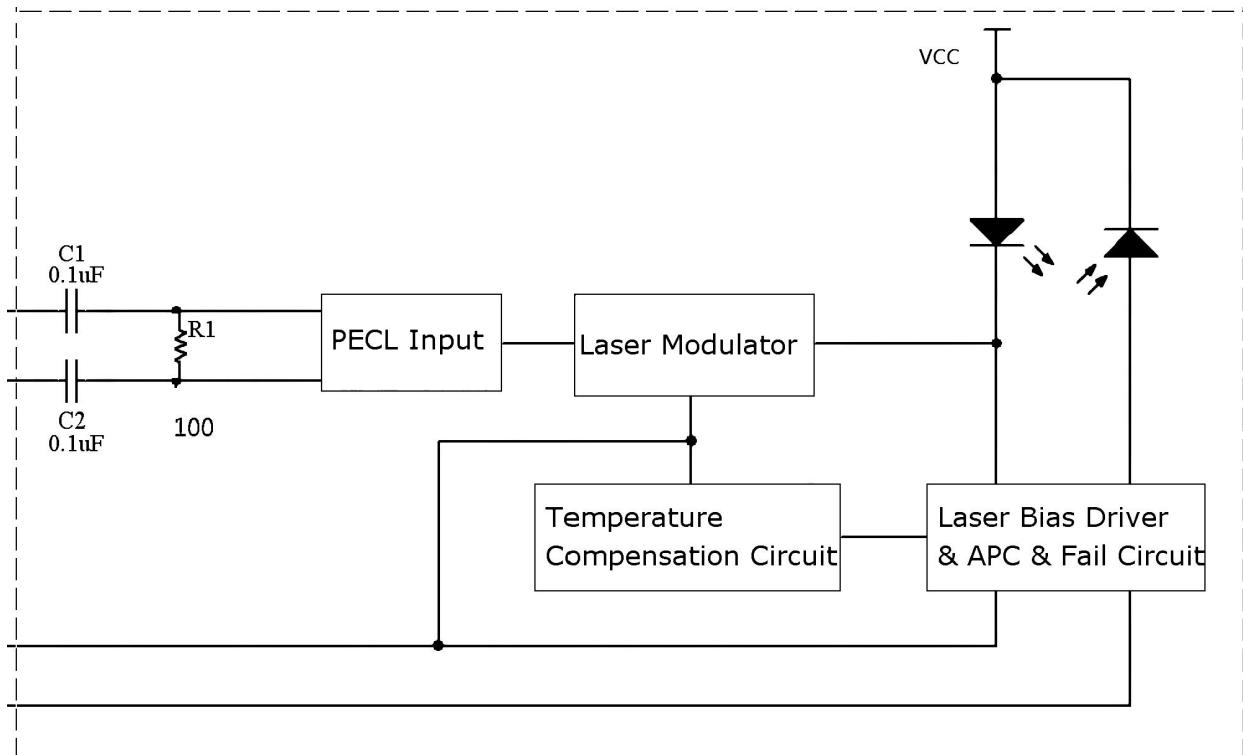
# Product Datasheet

## TransmitterSection

Transmitter is designed for single mode fiber and operates at a nominal wavelength of 1310nm. The transmitter module uses a laser diode and full IEC825 and CDRH class 1 eye safety. The output power can be disabled via the single TX-disable pin. Logic LVTTTL HIGH level disables the transmitter. It contains APC function, temperature compensation circuit, PECL data inputs, LVTT LTX-disable input and TX-fault Output interface.

## ReceiverSection

The receiver section uses a hermetic packaged front end receiver (InGaAsPIN and preamplifier). The post amplifier is AC coupled to preamplifier through a capacitor and a low pass filter. The capacitor and LPF are enough to pass the signal from 100Mb/s to 1300Mb/s without significant distortion or performance penalty. The LPF limits the preamplifier bandwidth to improve receiver sensitivity. As the input optical is decreased, LOS will switch from low to high. As the input optical power is increased from very low levels, LOS will switch back from high to low.



Transmitter Block Diagram

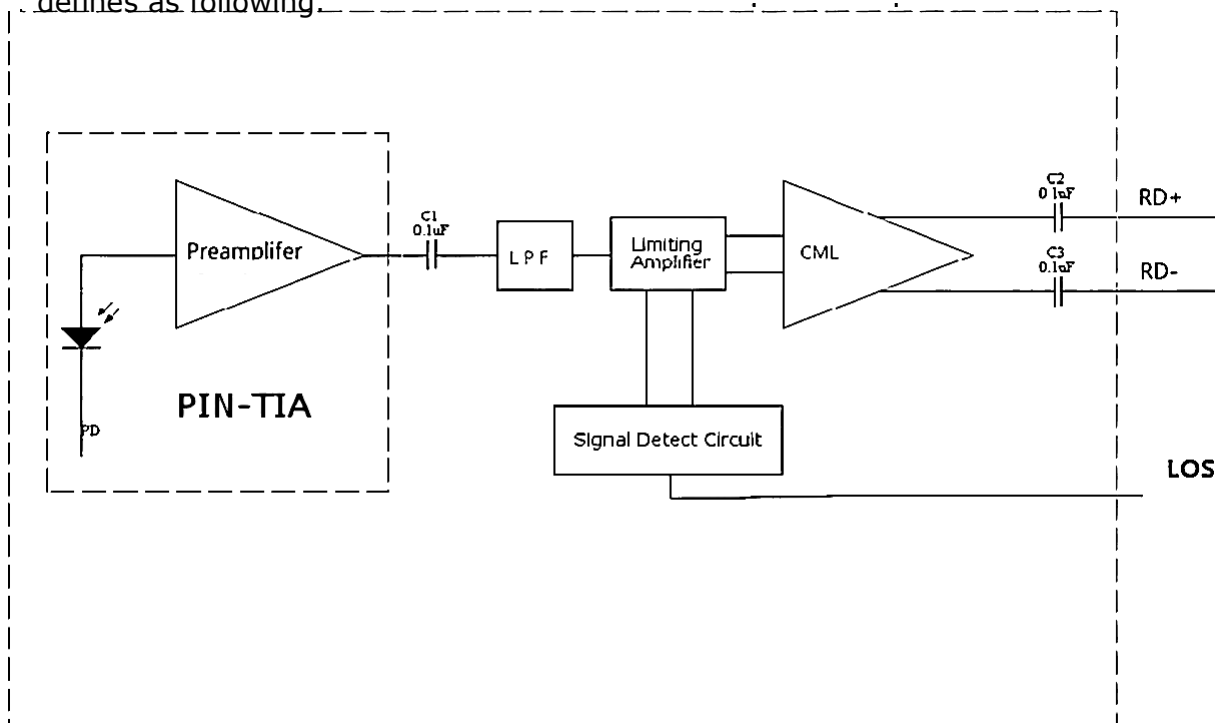
# Product Datasheet

## DDMI Section

The DDMI contains an EEPROM. It provides access to sophisticated identification information that describes the transceiver's capabilities, standard interfaces, manufacturer, and other information.

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the 24C02. When the serial protocol is activated, the host generates the serial clock signal (SCL, ModDef1). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA, ModDef2) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.

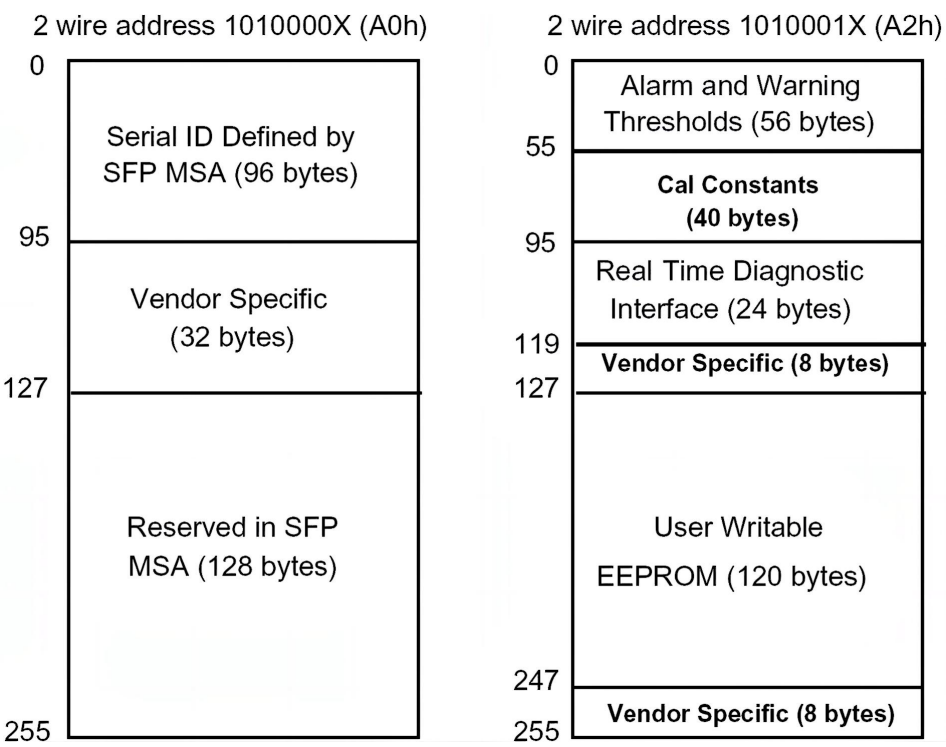
The Module provides diagnostic information about the present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56–95 at wire serial bus address A2h. The digital diagnostic memory map specific data field defines as following.



Receiver Block Diagram

# Product Datasheet

## MemoryMap



# Product Datasheet

## Performance Specifications

### Absolute Maximum Ratings

| Parameter             | Symbol                           | Min | Max             | Unit |
|-----------------------|----------------------------------|-----|-----------------|------|
| Storage Temperature   | Tst                              | -40 | +85             | °C   |
| Operating Temperature | DFP2-**24-*C**                   | 0   | +70             | °C   |
|                       | DFP2-**24-*E**                   | -20 | +85             | °C   |
|                       | DFP2-**24-*I**                   | -40 | +85             | °C   |
| Input Voltage         | -                                | GND | V <sub>CC</sub> | V    |
| Power Supply Voltage  | V <sub>CC</sub> -V <sub>EE</sub> | 0   | +3.6            | V    |

**Note:** Stress in excess of maximum absolute ratings can cause permanent damage to the module

### Recommended Operating Conditions

| Parameter                  | Symbol          | Min | Typ  | Max | Unit |
|----------------------------|-----------------|-----|------|-----|------|
| Storage Temperature        | Tst             | -40 | -    | +85 | °C   |
| Operating Case Temperature | DFP2-**24-*C**  | 0   | -    | +70 | °C   |
|                            | DFP2-**24-*E**  | -20 | -    | +85 | °C   |
|                            | DFP2-**24-*I**  | -40 | -    | +85 | °C   |
| Power Supply Voltage       | V <sub>CC</sub> | 3.1 | 3.3  | 3.5 | V    |
| Power Supply Current       | I <sub>CC</sub> | -   | -    | 300 | mA   |
| Data Rate                  | DR              | -   | 1250 | -   | Mbps |

### Optical Specification

| Transmitter                   |          |                         |      |      |      |      |                  |
|-------------------------------|----------|-------------------------|------|------|------|------|------------------|
| Parameter                     |          | Symbol                  | Min  | Typ  | Max  | Unit | Note             |
| CenterWavelength              | 1310     | $\lambda_c$             | 1261 | 1310 | 1360 | nm   |                  |
| SpectralWidth                 | 1310nmFP | $\Delta\lambda$         | -    | -    | 4    | nm   | -                |
| AverageOpticalOutputPower     |          | Po                      | -9   | -    | -3   | dBm  |                  |
| ExtinctionRatio               |          | ER                      | 9    | -    | -    | dB   | -                |
| OpticalRise/FallTime(20%-80%) |          | Tr/Tf                   | -    | -    | 0.27 | ns   | -                |
| OutputEye Diagram             |          | CompliantwithITU-TG.957 |      |      |      |      |                  |
| Receiver                      |          |                         |      |      |      |      |                  |
| Parameter                     |          | Symbol                  | Min  | Typ  | Max  | Unit | Note             |
| OperateWavelength             | 1550     | -                       | 1501 | 1550 | 1600 | nm   |                  |
| ReceiverSensitivity           |          | RSENS                   | -    | -    | -24  | dBm  | 1                |
| ReceiverSaturation            |          | PRS                     | -3   | -    | -    | dBm  | 1                |
| LOSAssert                     |          | -                       | -40  | -    | -    | dBm  | Alarm:High-level |
| LOSDe-Assert                  |          | -                       | -    | -    | -24  | dBm  |                  |
| LOSHysteresis                 |          | -                       | 0.5  | -    | 5    | dBm  | -                |

**Note:** 1. Minimum Sensitivity and saturation levels for a 2<sup>7</sup>-1PRBS test pattern @1250Mbps.

# Product Datasheet

## ✦ Electrical Specification

| Transmitter                     |         |                   |     |     |                 |      |      |
|---------------------------------|---------|-------------------|-----|-----|-----------------|------|------|
| Parameter                       |         | Symbol            | Min | Typ | Max             | Unit | Note |
| PowerSupplyCurrent              |         | I <sub>CC</sub> T | -   | 70  | 150             | mA   | 2    |
| InputDifferentialImpedance      |         | Z <sub>IN</sub>   | 90  | 100 | 110             | Ω    | -    |
| InputSwing DifferentialVoltage  |         | V <sub>IN</sub>   | 500 | -   | 2400            | mV   | 3    |
| TX-DisableVoltage               | Disable | -                 | 2.0 | -   | V <sub>CC</sub> | V    | -    |
|                                 | Enable  | -                 | 0   | -   | 0.8             | V    | -    |
| TX-FaultVoltage                 | Fault   | -                 | 2.0 | -   | V <sub>CC</sub> | V    | -    |
|                                 | Normal  | -                 | 0   | -   | 0.8             | V    | -    |
| Receiver                        |         |                   |     |     |                 |      |      |
| Parameter                       |         | Symbol            | Min | Typ | Max             | Unit | Note |
| PowerSupplyCurrent              |         | I <sub>CC</sub> R | -   | 70  | 140             | mA   | 2    |
| OutputSwing DifferentialVoltage |         | V <sub>OUT</sub>  | 600 | -   | 2000            | mV   | 4    |
| LOS Voltage                     | High    | -                 | 2.0 | -   | V <sub>CC</sub> | V    | -    |
|                                 | Low     | -                 | 0   | -   | 0.8             | V    | -    |

Note: 2. The current excludes the output load current.

3. CML input, internally AC-coupled and terminated.

4. Internally AC-coupled.

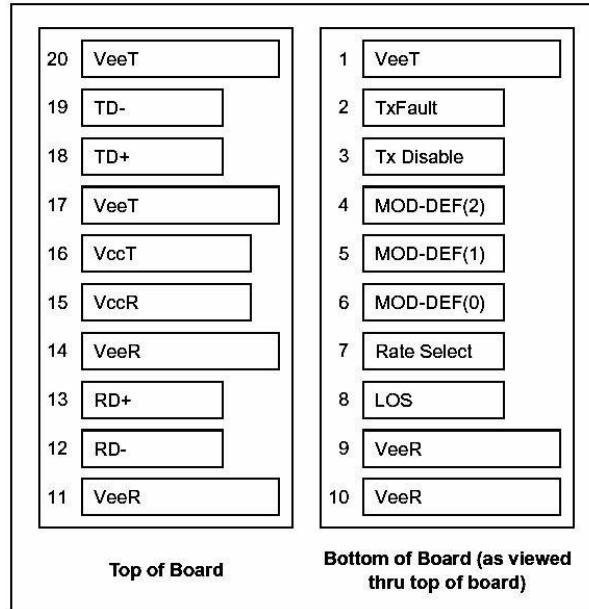
## ✦ Diagnostics Specification

| Parameter   | Range    | Unit | Accuracy | Calibration       |
|-------------|----------|------|----------|-------------------|
| Temperature | 0to+70   | °C   | ±3       | Internal/External |
|             | -40to+85 |      |          | Internal/External |
| Voltage     | 3.0to3.6 | V    | ±3%      | Internal/External |
| BiasCurrent | 0to100   | mA   | ±10%     | Internal/External |
| TXPower     | -9to-3   | dBm  | ±3       | Internal/External |
| RXPower     | -24to-3  | dBm  | ±3       | Internal/External |

# Product Datasheet

## PinDefinitions

### ✦ PINDiagram



### ✦ PINDescription

| PIN | Name              | Description                          | Notes   |
|-----|-------------------|--------------------------------------|---------|
| 1   | V <sub>EE</sub> T | TransmitterGround                    | -       |
| 2   | TX FAULT          | TransmitterFaultIndication           | Note1   |
| 3   | TX DISABLE        | TransmitterDisable                   | Note2   |
| 4   | MOD_DEF(2)        | SDASerialDataSignal                  | Note3   |
| 5   | MOD_DEF(1)        | SCL SerialClockSignal                | Note3   |
| 6   | MOD_DEF(0)        | ModuleAbsent.Groundedwithinthemodule | Note3   |
| 7   | RateSelect        | NotConnected                         | -       |
| 8   | LOS               | LossofSignal                         | Note4   |
| 9   | V <sub>EE</sub> R | Receiverground                       | -       |
| 10  | V <sub>EE</sub> R | Receiverground                       | -       |
| 11  | V <sub>EE</sub> R | Receiverground                       | -       |
| 12  | RD-               | Inv.ReceivedDataOut                  | Note5   |
| 13  | RD+               | ReceivedDataOut                      | Note5   |
| 14  | V <sub>EE</sub> R | Receiverground                       | -       |
| 15  | V <sub>CC</sub> R | ReceiverPower Supply                 | 3.3V±5% |
| 16  | V <sub>CC</sub> T | TransmitterPowerSupply               | 3.3V±5% |
| 17  | V <sub>EE</sub> T | TransmitterGround                    | -       |
| 18  | TD+               | TransmitDataIn                       | Note6   |
| 19  | TD-               | Inv.TransmitDataIn                   | Note6   |
| 20  | V <sub>EE</sub> T | TransmitterGround                    | -       |

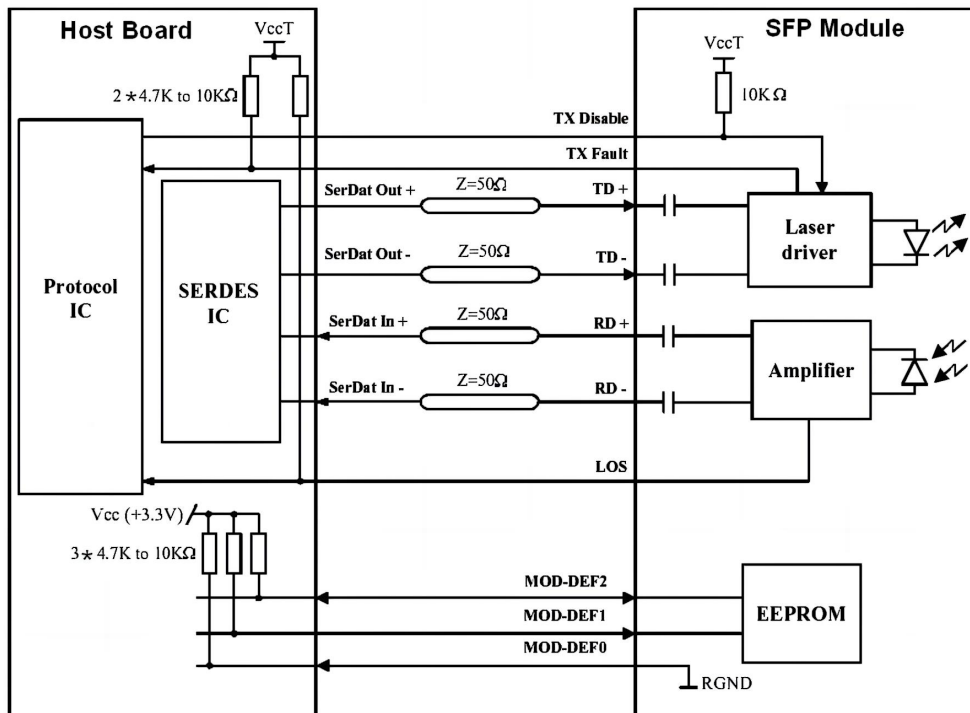


# Product Datasheet

## Notes:

- 1)TX Fault is an open collector output,which should be pulled up with a 4.7k-10K $\Omega$  resistor on the host board to a voltage between 2.0V and Vcc+0.3V,Logic 0 indicates normal operation;Logic 1 indicates a laser fault of some kind.In the low state,the output will be pulled to less than 0.8V
- 2)TX Disable is an input that is used to shut down the transmitter optical output.It is pulled up within the module with a 4.7k-10k $\Omega$  resistor.Its states are:  
Low (0 to 0.8V):Transmitter on  
(>0.8V,<2.0V):Undefined  
High(2.0 to 3.465V):Transmitter Disabled  
Open:Transmitter Disabled
- 3)Mod-Def 0,1,2.These are the module definition pins.They should be pulled up with a 4.7k-10k $\Omega$  resistor on the host board.The pull-up voltage shall be VccT or VccR.  
Mod-Def 0 is grounded by the module to indicate that the module is present  
Mod-Def 1 is the clock line of two wire serial interface for serial ID  
ID Mod-Def 2 is the data line of two wire serial interface for serial ID
- 4)LOS is an open collector output,which should be pulled up with a 4.7k-10k $\Omega$  resistor. Pull up voltage between 2.0V and Vcc+0.3V.Logic 1 indicates loss of signal;Logic 0 indicates normal operation.In the low state,the out put will be pulled to less than 0.8V.
- 5)RD-/+:These are the differential receiver outputs.They are internally AC-coupled 1002differential lines which should be terminated with 1002(differential)at the user SERDES.
- 6)TD-/4:These are the differential transmitter inputs.They are internally AC-coupled, differential lines with 100.2 differential termination inside the module.

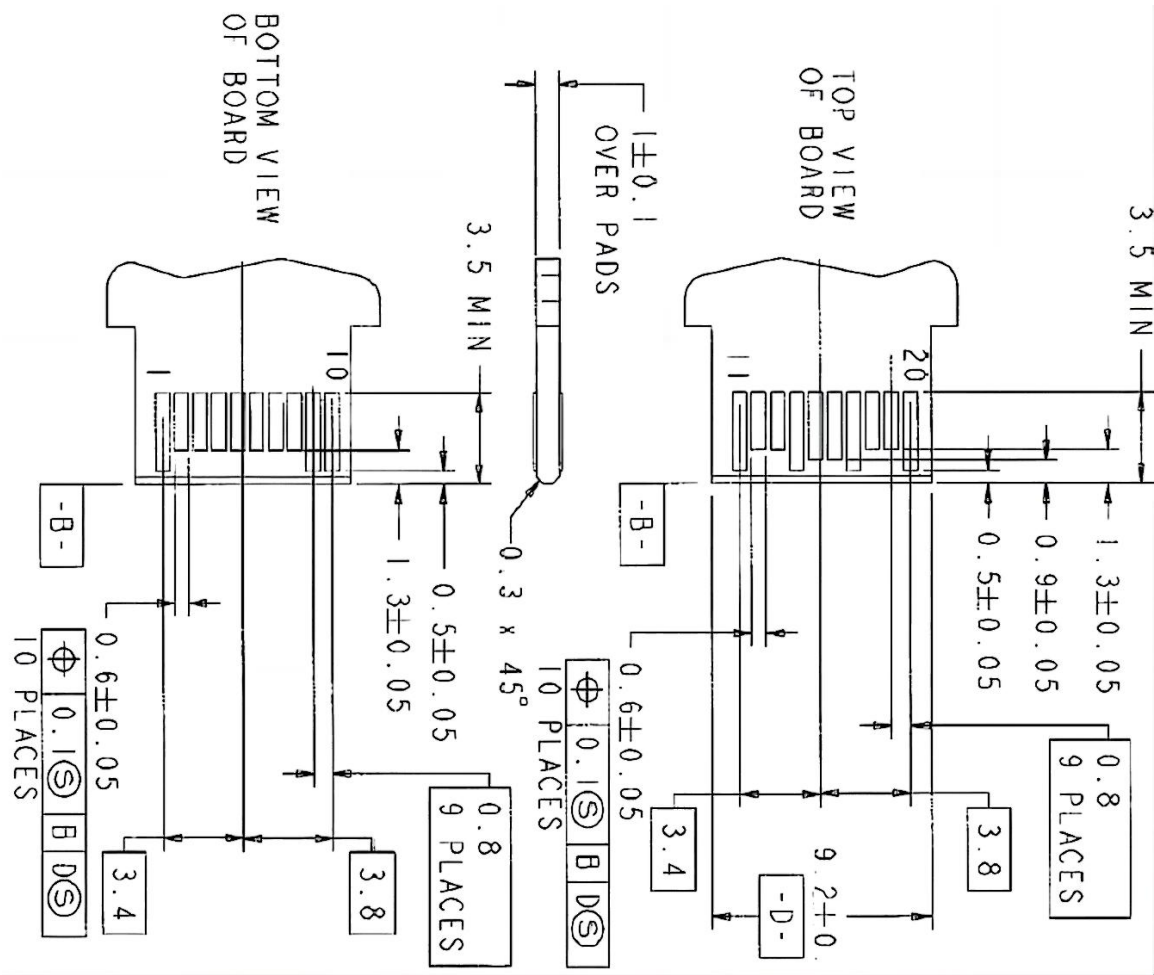
## Recommended Circuit



# Product Datasheet

## PackageDiagram

### BoardLayoutHolePattern



# Product Datasheet

## SCSideInterface

